

## OBSERVATIONS ON THE DIAGNOSIS AND TREATMENT OF TYPHOID PERFORATION.<sup>1</sup>

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WHEN we consider the fact that perforation occurs in 2.5 to 3 per cent. of all cases of typhoid, and that fully one-third of the mortality of the disease is due to this cause, the importance of the surgical treatment of this complication, by which approximately 25 per cent. of cases are saved, is evident at once.

In accordance with the above it is estimated that something like 25,000 die annually from typhoid perforation, one-quarter of whom might be saved if promptly operated upon. Osler<sup>1</sup> says that during the first 10 years of the Johns Hopkins Hospital nearly one-third of the mortality of typhoid was due to perforation, and that since then this proportion has increased owing to the striking reduction of the death-rate of the toxæmic group.

As to the mortality of these cases subjected to surgical operation, Harte and Ashhurst,<sup>2</sup> in a paper read in 1903, collected 362 cases with a mortality of 74.03 per cent. Doubtless this is a little too low if all the cases operated upon could be included, for unsuccessful cases are often not reported except in connection with successful cases.

The result of surgical operation in typhoid perforation has doubtless improved in recent years. This improvement depends largely on two factors, an early diagnosis, with a correspondingly early operation, and improvements in the technique. In some of the cases operated upon I have been im-

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pressed with the advanced stage of the peritonitis in comparison with the supposed time since perforation. It is true that it is a well-established fact that peritonitis may occur without actual perforation. G. G. Davis<sup>3</sup> and E. G. Cutler and J. W. Elliot<sup>4</sup> have reported operations for peritonitis during typhoid where no perforation and no other cause of the peritonitis was found save in the latter case a deep ulceration about ready to perforate. It is quite likely that the peritonitis in not a few cases operated on after perforation may have commenced before the actual perforation.

All are agreed that an operation as soon as possible after perforation, which depends upon an early diagnosis, is most essential to the best results. The fact that the results in cases operated upon long after perforation has occurred have been surprisingly good is not incompatible with the importance of early operation. In the statistical tables of Harte and Ashhurst<sup>2</sup> 55 cases were operated on over 36 hours after perforation with a mortality of 67.2 per cent., a lower mortality than in those operated on at any earlier period. This is readily explained by the fact that patients surviving the perforation so long have a milder infection or the process has been slow enough to permit a combative reaction or a limitation of the process. My own experience is limited to 6 cases operated on in the Presbyterian Hospital and 1 case in private practice. In addition I have collected the remaining cases, 11 in number, operated on in the Presbyterian Hospital in the last 10 years, comprising all the cases operated on for typhoid perforation according to the records, in order to study the symptoms which have led to the diagnosis of perforation.

Although medical men are more alert than ever to make the diagnosis of perforation, the difficulties have not materially diminished except in so far as they are more ready to advise exploratory operation when perforation is suspected. As Osler<sup>1</sup> has said, what we need is a fuller knowledge of the symptoms of perforation apart from those of the consecutive peritonitis, which is what is usually diagnosed.

It is at the end of the second week and in the third week that we are to be on the look out, and from then on, even throughout convalescence. The average period of the disease at which perforation occurred in my group of 17 hospital cases was the twenty-seventh day of the disease.

We are to bear in mind the greater probability of perforation in severe cases and in those with distention or hæmorrhage, and that it is not uncommon in walking typhoid. In 4 of the 17 cases in the table there had been previous hæmorrhage; in at least 1 case distention had been a marked feature; but in the majority of cases the previous course had been that of a typical typhoid and not unusually severe.

Having, then, a certain period and certain types of cases in which we are to be especially on the outlook for signs of perforation, what are these signs or symptoms? I have divided the symptoms present in each case into two groups, the initial symptoms and those subsequently developed, the latter depending on the consecutive peritonitis.

There is only one symptom that has been nearly uniformly present in all the cases on the list, and that is abdominal pain, usually coming on suddenly and generally severe. It was present in 15 out of 17 cases, and slight pain was present in another case. It is usually complained of in the lower half of the abdomen and most often on the right side. In the one remaining case it is distinctly stated that there was no pain, and here an apparently walled-off cavity containing fæcal matter and lymph was found on operation. In the case in which the pain was slight there was no perforation in the ileum but sloughing areas in the sigmoid, with perforation.

Tenderness was the next most common symptom, being noted in 7 cases in the early stages and in 5 others subsequently. Rigidity was only mentioned in 4 cases at the outset but developed in 9 others before operation. Perhaps the percentage of cases showing tenderness and rigidity as initial symptoms is lower than in the experience of most others, but these are symptoms of peritonitis, and the most reliable ones, rather than of the perforation itself.

The complaint of sudden severe abdominal pain is noted by writers on the subject as a "reliable and constant symptom" (F. T. Stewart<sup>5</sup>), "the note of alarm," (Armstrong<sup>6</sup>), "the most valuable sign," (McCrae & Mitchell<sup>7</sup>), and one that should "always lead to the suspicion of perforation and beginning peritoneal infection" (Shattuck, Warren and Fraser<sup>8</sup>).

To be sure, as pointed out by Stewart,<sup>5</sup> pain is a frequent symptom in uncomplicated cases of typhoid, tenderness is common over the ileum and slight rigidity may be present. But the sudden onset of severe pain in the right lower quadrant or the lower half of the abdomen in a case of typhoid should create a very strong suspicion of perforation. If in a short time tenderness and rigidity are associated with it we should not wait for further indications but advise operation at once. If we have any symptom of the perforation itself it is the severe pain of sudden onset, and if this merely indicates commencing peritonitis it is the best early symptom that we have.

I agree with Harte<sup>2</sup> that rigidity is a most valuable sign; but that "it is never wanting except in patients with unusually large and pendulous abdomens" I can not agree. In at least two cases on the list its absence was noted and in one case (No. 14), in spite of the absence of liver dulness, its absence at my first examination led me to delay operation and thus miss the most favorable time to operate. Since that experience I would not wait for the presence of rigidity before making the diagnosis of perforation or advising operation. Rigidity and tenderness are our most valuable signs of peritonitis and are not always present until this is well established. In typhoid the sensorium seems to be so blunted that they are not present as certainly or as early as in cases of appendicitis.

Vomiting was present in 4 cases as one of the initial symptoms, often in consequence of the severe abdominal pain, but in one case without any pain or other symptom but weakness (Case IX). Vomiting was present in 7 other cases among stage but was slight in one case and had been constantly present in the other.

An initial fall of temperature was not noted in any case. As Osler<sup>1</sup> says, "The time-honored picture of perforation must be erased." It was present as a late symptom in 2 cases, indicating collapse due to peritonitic absorption. Murphy<sup>9</sup> rightly lays great stress on the point that there is little depression immediately after the perforation of the intestine and no collapse, and that the latter is a late symptom and the expression of absorption of infective material. It is an unfavorable symptom. Early collapse is more a symptom of hæmorrhage than of perforation, both of which may occur together.

Among the late symptoms more or less distention or tympanites was noted in 13 cases, dullness in the flanks in 4, diminution or absence of abdominal breathing in 5, and of the liver dullness in 5. The loss or lessening of liver dullness with a flat belly may be pathognomonic of intestinal perforation, but it is a late and variable symptom as a rule. The leucocyte count was not of much assistance. It was high (over 12,000) in 3 cases and somewhat high for typhoid in 4 (7700, 7900, 8000, 9200), but in one of the latter it had been 12,000 six days before. In others it remained low.

Rise of temperature, pulse and respiration was the rule; in some cases the temperature became high.

The late symptoms confirm the diagnosis but we should endeavor to operate before these symptoms develop.

We need nothing more than the characteristic pain, tenderness in a fixed spot, and rigidity, to indicate an immediate operation, and we need not require both the tenderness and rigidity to be present before proceeding to an exploratory operation. The latter is quite safe, far safer than a fatal delay, and one may perhaps anticipate perforation and, by infolding the intestine over the sloughy base of an ulcer, prevent it. In one case during the past summer, having recently had the experience above referred to, when, owing to the absence of rigidity and marked tenderness, I delayed operation when perforation existed, I did an exploratory operation when

there was merely a strong suspicion of perforation on the part of the medical staff. The patient at the end of the second week of the disease complained of sudden severe abdominal pain and considerable tenderness in the right lower quadrant, and there was diminished abdominal respiration. No rigidity or other symptoms were present. On operation no perforation and no peritonitis was found. As a result of an appendicectomy and salpingectomy done four years before there were several bands of adhesions, binding the ileum into the pelvis, which were freed. One of these was adherent to the ileum at the situation of an ulcerated Peyer's patch and, together with the neighboring intestine, was quite congested. After operation the patient was free from the pain and tenderness and made an uninterrupted convalescence. In another such case operated on by Dr. F. Tilden Brown last summer no perforation was found and the temperature fell to normal the next day and continued so. I have explored through an incision under cocaine anæsthesia and found no free gas, fluid or other signs of peritonitis and hence excluded perforation. In such cases one can exhaust a sterilized catheter passed to the bottom of the pelvis to determine the absence or character of free fluid.

In connection with the operation itself there are several points as to which opinion and practice among different surgeons vary to some extent. Firstly, as to anæsthesia. I much prefer general anæsthesia. These cases take gas and ether well, and the latter is a heart stimulant. In my first two cases at the Presbyterian Hospital I used cocaine anæsthesia. The incision is painless and the procedure is satisfactory for the purpose of exploration to determine whether free fluid or other signs of perforation or peritonitis are present. But retraction of the edges and the necessary handling of the inflated intestines are painful and this together with the realization of being subjected to operation, in spite of a blunted sensibility, causes more shock than the same operation under general anæsthesia. Most surgeons now prefer general anæsthesia but others, such as Cushing,<sup>10</sup> and Hays<sup>11</sup> operate mostly under cocaine anæ-

thesia. If cocaine is used a few whiffs of chloroform may be advantageously given when the peritoneal cavity is opened.

As the lower three feet of the ileum is by far the most frequent site for the perforation,—in 95.5 per cent. according to Haggard,<sup>12</sup> while according to Harte <sup>2</sup> 73 per cent. were in the lower twelve inches,—the incision should be placed so as to readily expose this part. I prefer the incision through the right rectus, as the lower end of this allows better drainage of the pelvis than the right oblique incision which is preferred by some. Owing to the fact that in cases at the time of operation there is as a rule more or less free fluid, often of a foul odor, and some intestinal contents extravasated, the best method of getting rid of this is important. My personal preference is for irrigation with a large amount of hot normal saline solution through a large Chamberlain tube. In these cases there are seldom many if any adhesions and all parts of the peritoneal cavity may be irrigated and cleansed with the least possible traumatism. Furthermore the hot saline is an effective stimulant. In the table of hospital cases irrigation was used in 14, not mentioned in 2 and not used in 1. In the last named only the area about the perforation was cleansed with the salt solution, and though operated on about 2 hours after the perforation, in relatively good condition, the patient died with symptoms of peritonitis less than 36 hours after operation. Whether the occurrence of peritonitis would have been avoided by irrigation no one can say. Some surgeons do not irrigate. Thus of 7 cases reported by McCrae and Mitchell,<sup>7</sup> as operated on at the Johns Hopkins Hospital, irrigation was employed in only one case.

Anderson,<sup>13</sup> believing that the cause of death after operation for typhoid perforation is toxæmia from the contents of the paralyzed bowel, recommends that the ileum be emptied of its contents and the bowel itself irrigated through the perforation and through special incisions. He has used this method in 9 cases with satisfactory results. The chief objection to this procedure lies in the time required, as it is generally agreed that a short operation and an early operation are two of the essential requirements for success.

Drainage is almost always used. In one successful case of Dr. F. T. Brown's (see table) drainage was omitted but there was little or no free fluid. The method of drainage varies greatly. After irrigation I use a large rubber tube split down the side, with a core of gauze, or else a large cigarette drain introduced well down into the pelvis. According to the experiments of F. T. Murphy,<sup>14</sup> the latter is walled off earlier; the tube, therefore, drains the general peritoneal cavity for a longer time. Then with the head of the bed raised very high, in the high Fowler position, gravity assists all free fluid into the pelvis from which it is drained away.

In the table of 17 hospital cases 4 recovered, a mortality of 76.4 per cent. Of my own 6 hospital cases 2 recovered, a mortality of 66.6 per cent., or, including one previous case operated on in private for septic peritonitis of origin unknown to the two eminent consultants who saw the case three hours previously, a mortality of 71.4 per cent.

Of the cases which died, my first case died on the table while infusion was being given. Operation had been made possible only by a clysis given just before. Fifty-two hours was the longest that any fatal case survived the operation.

The time between perforation and operation varied from 2 to 30 hours, and averaged 10.3 hours in the 15 in which it is mentioned. The day of the disease on which perforation occurred varied from the tenth to the sixty-sixth and averaged the twenty-seventh day. Three were in the second week, 5 in the third, 1 in the fourth and 7 at a later period. Of those that recovered one was shown to the N. Y. Surgical Society by me in December, 1905. My other successful case subsequently developed Pott's disease of the spine. As to his convalescence, his temperature first reached normal 19 days after operation and a week later he had what appeared to be a relapse for 12 or 13 days. Sixteen days after operation he developed a faecal fistula through the sinus left by the drains. This fistula closed in 3 weeks. Whether this came from the sutured perforation



or a second perforation, cannot be definitely stated. Cases where a second perforation has occurred subsequently have been nearly uniformly fatal.

In connection with the cases that recovered it may be of interest to call attention to the fact that the ages were 9, 13, 17, and 23. The percentage of recovery in cases of children from 6 to 15 years is about twice that of adults. These cases developed in the tenth, forty-fourth, sixty-sixth and twenty-ninth day of the disease respectively. The cases developing on the forty-fourth and sixty-sixth day of the disease were in a relapse, and such cases as well as those occurring in convalescence give a more favorable prognosis.

The last case I operated on deserves especial mention on account of the unusual site of the perforation, *i.e.*, in the sigmoid colon. This patient, M. B., 20 years old, had run a fairly typical typhoid course with considerable abdominal distention throughout when, on the morning of the twenty-fifth day, the day of the perforation, she passed a few small blood-clots through the rectal tube. The pain at the time of perforation was not very acute and was referred, with the tenderness, to the left lower quadrant. There was no rigidity. The incision was made in the median line on account of the symptoms and no perforation was found in the ileum after careful search. On examining the large intestine a good sized irregular necrotic area was found in the sigmoid with a perforation on either side. This was inverted with two rows of Lembert sutures with some difficulty, owing to the friable condition of the surrounding parts. She died 18 hours after operation. On post-mortem the sigmoid for 6 or 8 inches in the vicinity of the perforation presented a worm-eaten appearance of the mucosa, the edges of the ulcerations not being undermined. At two other points perforation appeared imminent. The perforated area was gangrenous.

In the tables of Hare and Ashhurst among 190 cases the large intestine was involved only 7 times, and among these 7 the sigmoid only once. The prognosis is worse in cases of perforation of the large intestine and they have been overlooked and only found on autopsy.

In conclusion, without summarizing all the facts of importance, I would emphasize (1) the value of severe pain of sudden onset in the lower half of the abdomen as an early sign of perforation and its increased value as an indication for operation when associated with localized tenderness and rigidity; (2) the importance of exploratory operations in case of doubt in view of the good results which follow if no perforation is found and of the earlier period at which the operation is done if perforation is present.

# REFERENCES.

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- <sup>5</sup> F. T. Stewart, Am. Jour. Med. Sciences, May, 1904.
- <sup>6</sup> Armstrong. ANNALS OF SURGERY, Nov., 1902.
- <sup>7</sup> McCrac and Mitchell. Am. Medicine, Sept. 6, 1902.
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- <sup>12</sup> W. D. Haggard. Am. Journ. of Obstetrics, Sept., 1904.
- <sup>13</sup> Anderson. Am. Medicine, Dec. 31, 1904.
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TABLE OF CASES OPERATED ON AT THE PRESBYTERIAN HOSPITAL.

| No. | Name and Age. | Date.         | Operator. | Day of Disease.          | Previous Course of Disease.  | First Symptoms of Perforation.  | Subsequent Symptoms of Perforation.  | Time of Operation after Perforation. | Operation.  | Irrigation. | Drainage.                          | Result.                                   |
|-----|---------------|---------------|-----------|--------------------------|--|---|--|--------------------------------------|---|-------------|------------------------------------|---|
| 1   | M.D. 25       | Sep. 8, 1900  | Woolsey.  | 42<br>In Relapse.<br>(?) | 28 b. d. a. v. Temperature normal, then rose, continued high. Widal pos. 22 d. Diarrhea. Ordinary typhoid. | Abdominal pain and tenderness. Mass size of finger in right iliac fossa. Rigidity not mentioned. Severe abdominal pain. | Vomiting. Free peristalsis. High temperature. Pulse imperceptible. Clysis given before operation.  | 13 hrs.                              | Cocaine. Med. incision. Perforation 12" from caecum; 2 rows Lembert sutures. Retraction of wound and bandaging gut painful.                     | Yes         | Cigarette.                         | Died while in fusion being given on table |
| 2   | C.H. 24       | Oct. 11, 1900 | Hawkes.   | 10                       | Ordinary typhoid.  | Severe abdominal pain.  | After some hours increasing distention, tenderness and rigidity. Hiccough. Vomiting. Temp. 103° to 99°. L. C. 7,000 to 12,000 to 15,000.     | 30 hrs.                              | Through R. rectus. Yellow fluid, fecal odor. Perforation 12" from caecum. Tissue 3/4" around excised; 2 layers Lembert sutures.                 | Yes         | Rubber tube. Four strips of gauze. | Died in 5-6 hrs.                          |
| 3   | V.S. 18       | Feb. 17, 1901 | McCosh.   | 31                       | Ordinary; 2 hemorrhages 20 and 2 days before.  | Sudden abdominal pain. Vomiting in 2 hours.   | Increasing rigidity, distention and tympany. Slight shifting tenderness in flanks. Lower abdomen lost. Double friction rub. Rt. Cost margin. | 9 1/4 hrs.                           | Cocaine. R. intermuscular incision. A little chloroform. Foul green fluid. Perforation 3/4" diam., 8" from caecum. Three tiers Lembert sutures. | Yes         | Glass. Several strips of gauze.    | Died in 32 hrs.                           |
| 4   | E.J.F. 24     | July 26, 1901 | Woolsey.  | 15                       | Entered hosp. as appendicitis 15 days ago. Widal pos. Haem. yesterday.                                     | Severe constant abdominal pain and tenderness.  | Vomiting. Distention. Abdomen sore. L. C. 8,000 (12,000 6 days ago).   | 14 hrs.                              | Cocaine. Med. incision. Large amount purulent serum. Perforation 2" from caecum. Lembert sutures.   | Yes         | 3 Cigarette.                       | Died in 8 1/4 hrs.                        |
| 5   | A.S. 21       | Aug. 3, 1902  | Brown.    | 36                       | Ordinary course. Widal positive.   | Severe pain in caecal region, disappeared with ice bag, returned more severe.   | Tenderness, rigidity, retraction and then slight distention. Vomiting. Temperature.  | 20 hrs.                              | Chloroform. Med. incision. Foul yellow fluid; 3 perforations in ileum sutured.  | Yes         | Vaginal.                           | Died in 28 hrs.                           |
| 6   | K.M. 23       | Sep. 6, 1902  | Brown.    | 29                       | Ordinary. Widal positive 14th day. Numerous hemorrhages.   | Very severe pain in right lower quadrant. No rigidity or tympany.   | Dullness over lower abdomen. Temp. and pulse rose. Rigidity and tympany began to appear. L. C. 3,600.  | 7 hrs.                               | Gas and ether. Intermuscular incision. Adherent omentum nearly closed minute perforation.   | ?           | No drainage.                       | Recovery.                                 |

|    |              |                  |             |                                 |  |  |  |         |  |     |   |   |
|----|--------------|------------------|-------------|---------------------------------|--|--|--|---------|--|-----|---|---|
| 7  | M.E.<br>23   | July 26,<br>1902 | Brown.      | 40                              | Ordinary ty-<br>phoid.   | Sudden pain,<br>tenderness<br>and rigidity<br>in Rt. iliac<br>fossa.                     | Liver dullness 1" high.<br>No abdominal respi-<br>ration. Rigidity and<br>tenderness increased.<br>L. C. 6,200.  | 4½ hrs. | Chloroform. Rt. rectus in-<br>cision. Free fluid,<br>no gas. Perf. 2½" in<br>diameter sutured.   | Yes | Cigarette.  | Died in 14 hrs.   |
| 8  | H.M.<br>9    | Sep. 23,<br>1903 | Woolsey.    | 10                              | In bed only 1<br>week. Had<br>solid food.<br>Brought to<br>hospital with<br>peritonitis.<br>Diag. appen-<br>dicitis. | Abdominal pain<br>and tender-<br>ness.   | Some rigidity, tender-<br>ness and tympanites.<br>Diminished peristal-<br>sis and abdominal<br>respiration.  | ?       | Gas and ether. Rt. in-<br>termuscular incision.<br>Appendix normal re-<br>moved. Perforant<br>sutured. Perf. 18"<br>in ileum. Purse<br>string and row of<br>Lembert sutures.<br>Thinned patch in-<br>serted. | Yes | Large cigar-<br>ette to pelvis<br>and K. iliac<br>fossa.                            | Recovery. On<br>16th day fecal<br>fistula. Re-<br>lapse. Later<br>perforant<br>disease<br>of spine. |
| 9  | B.B.         | Oct. 21,<br>1903 | McCosh.     | About<br>21                     | Typical.   | Vomiting, in-<br>ability to hold<br>anything on<br>the stomach.<br>Weakness.<br>No pain. | Distention, slight rig-<br>idity in Rt. lower<br>quadrant.   | ?       | Chloroform. Incision<br>through R. rectus.<br>Perf. in lower ileum.<br>Silk Lembert sutures.<br>Apparently walled off<br>cavity containing<br>fecal matter, lymph,<br>etc.                                   | ?   | Cigarette.  | Died in 25 hrs  |
| 10 | E.M.<br>54   | Nov. 6,<br>1903  | McWilliams. | Sick<br>some<br>days.           | Brought to<br>hospital with<br>symptoms of<br>peritonitis.   | Intense abdo-<br>minal pain.   | No abdominal respi-<br>ration. Distention.<br>Markable dullness in<br>flanks. General ten-<br>derness.   | ?       | Gas and ether. Med.<br>incision. Foul serum.<br>Perf. 16" fr. cecum.<br>Purse string suture.   | Yes | 2 Cigarette.  | Died in 35 hrs.   |
| 11 | W.J.K.<br>21 | Sep. 22,<br>1904 | Hawkes.     | 15                              | Ordinary ty-<br>phoid.   | Severe abdom-<br>inal pain.<br>Rigidity in<br>lower abdo-<br>men.                        | Temperature rose to<br>106°. Vomiting. Ty-<br>pical signs of peri-<br>tonitis.   | 6 hrs.  | Gas and ether. Med.<br>incision. Free gas<br>and serum. Perf. 18"<br>from cecum. Two<br>layers of Lembert<br>sutures.  | Yes | 3 Cigarette.  | Died in 6 hrs.  |
| 12 | M.M.<br>19   | Sep. 30,<br>1904 | Hawkes.     | 20                              | Considerable<br>abdominal<br>pain.   | Sudden severe<br>pain in Rt.<br>iliac fossa,<br>with tender-<br>ness and rig-<br>idity.  | Vomiting. Hiccough.<br>Liver dullness dimin-<br>ished. L. C. 7,900.  | 4 hrs.  | Gas and ether. Med.<br>incision. A little gas<br>and serum. Perf.<br>2½" diam. 12" from<br>cecum. Two layers<br>of Lembert sutures.  | Yes | 2 Cigarette.  | Died in 59 hrs.   |
| 13 | W.C.<br>17   | July 28,<br>1905 | Woolsey.    | 66<br>24th<br>day of<br>relapse | Original fever<br>8 days. Nor-<br>mal 19 days.<br>Relapse se-<br>vere. Widal<br>pos. 2d week<br>of relapse.          | Sudden pain in<br>Rt. lower<br>quadrant.<br>Marked ten-<br>derness below<br>umbilicus.   | Temp. 106° (from 100°).<br>L. C. 7,200. Rigidity<br>below umbilicus.<br>Tympanites. Slight<br>shifting dullness. Ab-<br>dominal respiration<br>absent in lower half. | 6 hrs.  | Gas and ether. R.<br>rectus incision. Foul<br>greenish fluid. Perf.<br>2½" diam. 15" from<br>cecum. Two rows<br>of Lembert sutures.<br>Omentum adherent<br>to gut at<br>patch above.                         | Yes | Large rubber<br>tube with<br>gauze core to<br>pelvis. High<br>Fowler posi-<br>tion. | Recovery. Re-<br>lapse very<br>long, followed<br>by another re-<br>lapse.                           |

TABLE OF CASES OPERATED ON AT THE PRESBYTERIAN HOSPITAL—Continued.

| No. | Name and Age. | Date.            | Operator. | Day of Disease.    | Previous Course of Disease.   | First Symptoms of Perforation.  | Subsequent Symptoms of Perforation.   | Time of Oper'n after Perfn. | Operation.   | Irrigation.               | Drainage.                                     | Result.         |
|-----|---------------|------------------|-----------|--------------------|---|---|---|-----------------------------|--|---------------------------|---|-----------------|
| 14  | E.S.<br>25    | Aug. 19,<br>1905 | Woodsey.  | 14                 | 4 weeks ago heat prostration. Widal negative. L. C. 14th. 13-600; 19th. 17-300.                     | Sudden abdominal pain. Disappeared and then returned. Abdominal distention. Liver distended but soft. | First seen by me after enema, when symptoms temporarily relieved. Later slight rigidity and distention. Temperature fell to 99°. Liver dullness absent.   | 24 hrs.                     | Gas and ether. R. rectus incision. Gas and free fluid. Perf. 1/2" in diameter in lower 18" of ileum. Purse string and row of Lembert sutures.  | Yes                       | Large cigarette drain.                        | Died in 14 hrs. |
| 15  | M.B.<br>20    | Sep. 15,<br>1905 | Woodsey.  | 25                 | Typical. Widal positive. Distended all along. L. C. 6700. Blood through rectal tube, Sep. 13. a. m. | Some pain in left lower quadrant. Distention and rise of temperature.                                 | Vomiting. Temp. 100°. Pulse 120. Distention and tenderness below and to left of umbilicus. Pain not severe. No rigidity. Liver dullness normal.           | 4 1/2 hrs.                  | Ether. Med. incision. Gas and some free fluid. No perf. in ileum. In sigmoid good sized irregular area necrotic. Perf. on either side inverted with two rows of Lembert sutures; very friable. | Yes                       | Rubber tube, etc., and large cigarette drain. | Died in 18 hrs. |
| 16  | G.H.<br>21    | Dec. 19,<br>1905 | Elliot.   | 18                 | Typical.  | Sudden severe pain and chill. Onset with nausea and vomiting.   | Temp. rose 102° to 103°. L. C. 11,400 to 12,300. Abdomen tender, rigid, slight distention. Liver dullness diminished.                                     | 2 hrs.                      | Gas and ether. R. rectus incision. Free gas and 8 oz. free fluid. Perf. 8" from cecum. Purse string and one row Lembert sutures.   | No, only local cleansing. | Large cigarette.                              | Died.           |
| 17  | E.G.          | Jan. 14,<br>1906 | Hawkes.   | 44<br>Inter-lapse. | Typical. Widal positive. Distended for 3 days.  | Sudden severe pain R. L. C. With some local tenderness and rigidity.                                  | 4 hrs. later distention. Rigidity and tenderness especially in R. iliac region. Some flanks. Abdominal resp. diminished. L. C. 9,200. Temp. rose to 104°. | 5 hrs.                      | Ether. R. Intermuscular incision. Free fluid. no odor. Finhole perf. 8" from cecum. Purse string and Lembert sutures.  | Yes                       | Cigarette drain.                              | Recovery.       |